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(54) An arrangement in connection with a rack for orderly storage and/or for keeping syringes with a luer tip ready for use.

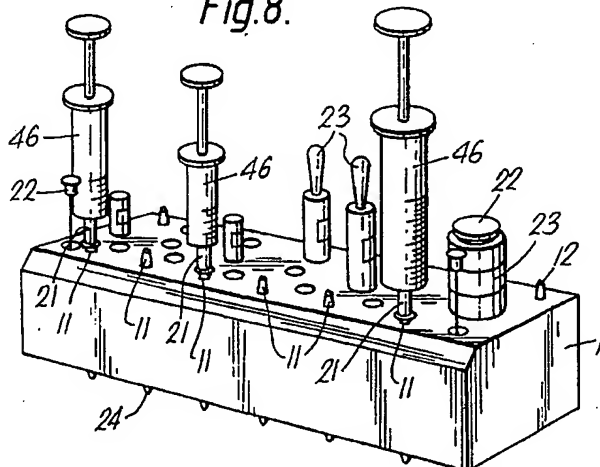
(57) A rack (1) for orderly storage and/or for keeping syringes (19), needles (22), ampullas (23), and the like ready for use. Said rack has receptacle means (11, 9, 8, 10) for said objects. For the syringes said receptacle means are shaped like spigots (11, 12, 24) designed like luer cones. The syringes may be placed on said spigots by the aid of bushing members (21) which are provided with receptacle means

(40, 41) at each end, which are dimensioned to receive the luer cone.

Syringes are stored in an orderly and easily surveyable sterile manner, ready for use.

Bushing member (21) may advantageously be used serving as a coupler means between two syringes.

Fig.8.



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## AN ARRANGEMENT IN CONNECTION WITH A RACK FOR ORDERLY STORAGE AND/OR FOR KEEPING SYRINGES WITH A LUER TIP READY FOR USE.

The invention relates to an arrangement in connection with a rack for orderly storage and/or for keeping syringes with a luer projection ready for use, said rack also comprising receptacle means for the syringes.

Syringes are used in all departments of the health sector. Some people inject themselves, e.g. diabetes patients, but in most cases the injection, i.e. the content of the syringe, is administered by a medical practitioner or a nurse.

The patient/user receives the injection either subcutaneously (under the skin), intramuscularly (in the muscle), or intravenously (via the vein system). The syringe content (medicament) may be administered by connecting the syringe with an intravenous cannula or by providing the syringe with a syringe needle which is introduced under the skin or into a muscle. Injections may also be administered in spinal/epidural ducts.

In any case, every object to be used must be sterile.

Syringes are filled by sucking the content of an ampulla or another container through a suction cannula. Such medicament suction may, e.g. be carried out in the patient's home, in separate syringe medicament rooms, in surgical theatres, wards for intensive care, etc.

In a surgical theatre syringes filled with a medicament are e.g. placed on an anaesthetics table. During administration to the patient and maintenance of narcosis, the medicament is administered as required. Use of several different syringes during one narcosis is not uncommon, and this means that there will be a plurality of syringes, ampullae and needles, etc. in circulation. Conditions may easily become slightly chaotic, since many different medicaments are also used. The hazard of making an error or administer a wrong medicament will increase when syringes after some time lie about in a mess, e.g. in an acute situation. This may happen in spite of the fact that each syringe should be marked with the kind of medicament to be administered.

As known, use of syringes generally requires the strictest possible hygiene, and the syringe or syringes, thus, must be kept under maximum hygienic conditions and safety against confusion from the moment they are filled and until they are used. A common procedure to day is that a sterile stop or plug is provided on the syringe tip upon the syringe being filled, and if the syringe tip is sterile. The syringe needle is kept in a sterile wrapping until it is to be used. Another procedure is to keep the syringe needle on the syringe, e.g. inserted in

the ampulla with the medicament to be used.

In the course of daily routines filled and ready syringes are kept on a tray or the like in a refrigerator, or on the patient's bedside table, etc. before the injection is administered to the patient. Often, it happens that the syringe is not reposing where it was put, but rolls about on the tray or may even fall down onto the floor. Needles and/or tips then often become less than sterile. The syringes have no firm bed and conditions easily get chaotic. The hygienic situation, as mentioned, may also become hazardous.

For inoculation or for administration of injections to many persons a plurality of equal syringes are often prepared. They are put side-by-side. It is unsatisfactory to have syringes lying about freely, because they may roll about and/or be touched in an undesirable manner, so that sterility is lost. If will, obviously, be even more difficult to maintain necessary hygienic conditions when there are different medicaments to be administered at the same time. The present system as regards storage of syringes with medicaments, from the moment the syringe is filled with the medicament and until the latter is administered, is thus not satisfactory. There is a hazard of sterility being lost, since routines do not comprise a firm and/or steady holder for the syringes. There is a hazard of administering a wrong medicament and/or a wrong dosis. In acute situations it will often be difficult to take in everything at a glance, e.g. when several filled syringes are placed together in a bowl or the like in a refrigerator. Some medicaments are stored for up to 24 hours after having been sucked in a sterile manner into a syringe, with a sterile plug/needle on the tip. This, obviously, does not improve conditions as regards hygiene. One of the known systems used to day, luer plugs, are bushing members having a cone shaped portion at one end with a finishing external locking thread. At the other end there is a bushing portion shaped with a slightly larger diameter and an internal locking thread, adapted to said cone shaped locking thread. The cone has a conical blind bore, adapted to the conical shape of the syringe tip, and the bushing member has an internal coaxial conical plug which is adapted to said conical blind bore in the locking cone.

When a medicament is to be sucked into a syringe from an ampulla or the like, this is commonly carried out through a suction cannula which is placed onto the syringe tip. When the syringe has been filled, the suction cannula is removed and a sterile luer plug is provided in stead. When the

medicament is to be administered, the luer plug is removed and the syringe tip is provided with a needle or a cannula.

It is a main object of the present invention to provide an arrangement in connection with a rack for orderly storage and/or for keeping syringes ready for use with the aim of achieving controlled and sterile conditions. Another object of the invention is to provide an arrangement in connection with a rack for orderly storage and/or for keeping syringes, needles, ampullae and the like prepared for use.

The invention is based on known technology, racks being known for receiving syringes, needles, ampullae, and the like.

According to the invention an arrangement in connection with a rack is, thus, proposed for orderly storage and/or for keeping syringes with a luer tip or a luer locking tip ready for use, which rack comprises receptacle means for the syringes. The characterizing feature according to the invention is that the syringe receptacle means comprise spigots which are integrated in the rack, and bushing members which may be placed on respective spigots, said bushing members being shaped for receiving the luer tip of the syringes.

The bushing member may have an inner transversal wall, so that both tip receptacle means are physically separated, or the transversal wall may be omitted, or it may, if desired, have a through hole. It is this open bushing member design which is of special interest, since it may be part of an advantageous transferring system for dosage of a medicament from one syringe to another mixture of two components/medicaments or for eliminating air.

Each bushing member may advantageously at its ends be provided for being locked to a luer thread in a bushing portion of a luer plug.

In a suitable embodiment of the invention the spigots are provided in one or a plurality of rows on a block shaped rack. Such a rack will be steady and compact. An arrangement of the spigots on two (or more) opposite lateral block faces is rendered possible. The rack will, thus, be utilized in the best possible manner and it may be made more universally applicable if spigots are arranged on one lateral block face, whereas spigots and other receptacle means - for needles, ampullae and the like - are placed on the opposite lateral block face.

The last mentioned embodiment is a preferred embodiment because it provides for orderly storage and/or for keeping ready syringes with associated needles, ampullae, and the like.

The filled syringes may, e.g. be placed in one row, whereas associated ampullae are placed in a parallel receptacle row. Required syringe needles may also be placed in a parallel row. In this man-

ner good order and survey is achieved.

The invention is disclosed in more detail below with reference to the drawings, in which

Figure 1 is a perspective view of a rack

Figure 2 shows the rack of Figure 1 as seen from below,

Figure 3 is a perspective view of a luer plug,

Figure 4 shows a partial section through the plug of Figure 3,

Figure 5 shows a bushing member in a perspective view, for use on the rack of Figures 10 and 11,

Figure 6 is a longitudinal section of the bushing member of Figure 5,

Figure 7 shows a portion of the rack of Figures 1 and 2, with a provided bushing member (in section), and with a syringe shown inserted in place in the bushing member,

Figure 8 is a perspective view of the rack design,

Figure 9 shows two syringes which are connected with the new bushing member according to Figures 5 and 6, and

Figure 10 shows two syringes which are connected with a bushing member having a closed transversal wall, and with one syringe being provided with a luer connection,

Figure 11 shows two syringes which are connected with the bushing member according to Figures 5 and 6, for mixture of two medicaments, and

Figure 12 shows two syringes which are connected with the bushing member according to Figures 5 and 6, for transfer of medicament from one syringe to the other.

The rack shown in Figures 1 and 2, see also Figure 9, is block-shaped. Block 1 suitably consists of a sterilizable material, e.g. a suitable plastic material.

Block 1 has four lateral block faces, 2, 3, 4, and 5, and two block end faces, 6 and 7.

In one lateral block face 2, as shown in Figure 1, several recesses, 8, 9, and 10 are formed. On the same block face 2 there are also several projecting spigots 11, 12.

Spigots 11 are arranged in a row along the edge, in the present case in a number of six spigots. On the opposite face edge two spigots 12 are placed, one at each block end. In parallel with and inside the row of spigots 11 a row of relatively deep recesses or depressions 9 are provided.

In parallel with said row of depressions 9 a row of slightly more shallow depressions or recesses 8 are provided. Behind said row of depressions 8 there is a row of shallow/deep depressions or recesses 10.

The deep recesses 9, which may, e.g. be blind bores, all have the same diameter in the embodi-

ment and are intended for receiving syringe needles.

The next row comprises depressions or blind bores 8 of varying diameters, in this case increasing towards the right hand side in Figure 1, which are intended for receiving ampullae.

Depressions 10, which may be shallow or deep, are intended for receiving other equipment that might be required, e.g. extra ampullae, medicament containers, needles, etc.

Spigots 11 and 12 are intended for receiving syringes, and the special function of the spigots will be explained in detail below.

At first, we will describe a luer plug in more detail. Such a typical and known luer plug is shown in Figures 3 and 4.

The luer plug shown in Figures 3 and 4 has a locking spigot portion 13 and a bushing portion 14. At the end of the locking spigot a locking thread is provided. The latter is intended for threaded and locking cooperation with an internal thread 16 in bushing portion 14. Centrally in bushing portion 14 there is a spigot 17 which is slightly conical externally. In locking spigot 13 a corresponding slightly conical bore 18 is provided. Said slightly conical bore 18 and said slightly conical spigot 17 are mutually adapted, so that spigot 17 on a luer plug may be inserted into conical bore 18 in a sealing manner. Slightly conical bore 18 is adapted to a so called luer cone, which is e.g. found on a syringe tip. This means that a syringe tip may be inserted into conical bore 18 for sealing cooperation with the luer plug. Locking thread 15 and internal thread 16 are mutually adapted so that locking spigot 13, 15 on a luer plug may be screwed into and cooperate with thread 16, with internal spigot 17 passing into conical bore 18 of an adjacent plug.

In the other recesses or bores, and on spigot 11, possibly also on spigot 12, other components may be arranged, e.g. additional ampullae, syringes, needles, etc.

On what may be called the lower side of rack 1 in Figure 1, totally eighteen spigots 24 are shown. They correspond to spigots 11 and 12 as to shape and function and are provided for the same reason. Rack side 4, shown in Figure 2, is especially suitable when a large number of preferably similar syringes is to be prepared for use, e.g. in connection with inoculation. In this case 18 syringes may be provided in rows in the rack. Associated needles may, if desired, be placed in receptacle bores in block face 4 or they may be placed in a bowl wrapped in a sterile manner until they are to be used.

When the rack is used as shown in Figures 1 and 8, the rack or block 1 rests on spigots 24, and vice versa, when the rack is used as shown in Figure 2, it rests in a stable and steady manner on

spigots 11, 12.

Spigots 11 and 12 are intended for receiving special bushing members 21, see Figures 7 and 8.

Such a bushing member 21 is shown in more detail in Figures 5 and 6.

It will appear from Figures 5 and 6 that this special bushing member is an externally ridged 39 circular cylinder, which at each end is provided with a plug receptacle means 40, 41, intended for receiving a form-fitting luer tip or luer cone. Receptacle means 40, 41 are separated by a transversal wall or partition 42. In the embodiment shown in a sectional view in Figure 6, said partition 42 has a through bore or a through hole 43, but the partition may also be unperforated so that said receptacle means are physically separated, see Figures 7 and 8.

Through opening 43 is of special interest in connection with utilization of the bushing member in a transfer system for transferring medicaments from one syringe to another. This will be disclosed in more detail below. Bushing member 21 has a flange shaped locking thread 44, 45 at each end intended for cooperation with a luer thread in a bushing shaped portion of a luer plug, see e.g. Figure 10. In this connection we also refer to what was mentioned above of luer plugs and the special design of such plugs.

In Figure 7 a portion of a rack 1 with spigots 11 is shown. On two spigots a bushing member 21 is provided. On one bushing member 21, shown in a longitudinal section, an inserted syringe 46 is indicated. Syringe 46 has a luer tip or cone 47 fitting into receptacle means 40 in the bushing member. Correspondingly, spigot 11 is adapted to be receptacle means 41. The spigot, as mentioned before, is advantageously shaped like a luer cone, i.e. corresponding to cone 47.

When a syringe 46 is to be placed in rack 1, a sterile wrapped bushing member 21 is removed from its wrapping and placed on spigot 11, whereupon syringe tip 47 may be inserted into slightly conical receptacle means 40, as shown in Figure 7. In this manner the syringe will be kept in the rack in a sterile manner.

Figure 8 shows an example of how rack 1 may be used. On three spigots 11 a respective bushing member 21 is placed and a syringe 46 is placed in each of members 21. In the recesses or bores associated syringes needles 22 and ampullae 23, etc. are placed.

On what may be called the rack underside in Figure 1, a total of eighteen spigots 24 are shown. They correspond to spigots 11 and 12 as to shape and function and are provided for the same reason. Rack side 4 shown in Figure 2 is especially suitable when a large number of preferably equal syringes is to be prepared for use, e.g. in connec-

tion with inoculation. In this case eighteen syringes may be placed in rows on the rack. Associated needles may, if desired, be placed in receptacle bores (not shown) in block face 4, or they may be placed in a bowl in their sterile wrappings, ready for use. When the rack is used as shown in Figures 1 and 8, the rack or block rests on spigots 24, and vice versa, when the rack is used as shown in Figure 2, it will rest in a stable and steady manner on spigots 11, 12.

As mentioned, bushing member 21 in the embodiment shown in the sectional view of Figure 6 in which the internal partition has a through bore, may additionally be utilized as a component in an advantageous manner when it is desirable to transfer a medicament from one syringe to another. Such a connection of two syringes is shown in Figures 9 - 12.

In the sectional views of Figures 9, 11 and 12 a syringe 48 with a syringe tip 49 and a syringe 50 with a syringe tip 51 are shown. Said two syringes are connected by the aid of bushing member 21, one syringe tip 49, as shown, being inserted into receptacle means 40, whereas the other syringe tip 51 is inserted in conical receptacle means 41.

At present no practical and inexpensive coupler means for two syringes is known. The invention provides a remedy. To mix liquid/liquid or medicaments from one syringe in another a syringe needle is used at present to be inserted in the orifice of the other syringe. The receiving syringe must then be prepared in advance to receive the injection/liquid volume.

It is also known, e.g. to use a three-way cock, but such a concept is not very practical and it is expensive, at the same time as there is a hazard of making wrong connections. There is thus, a strong demand for a simple, closed system (coupler) for the syringes, and this is the problem which is solved by the invention as shown in Figures 9 - 12.

According to another known concept for mixing two components e.g. two syringes are placed in parallel, side-by-side. The content is mixed when a common connection between both syringe plungers is depressed. This arrangement is not very satisfactory, both from environmental and health considerations. There is no closable connection between the units, which would be most desirable.

An application of interest would be when it is desirable to dose small volumes of medicament from a large filled syringe to a smaller one for accurate dosage. There is no satisfactory system for such applications to day.

In order to eliminate air collecting in the syringe, there is also no good remedy. The technique at present is to squirt a little medicament out of the syringe from which it is desired to remove air. This results in contamination of the environment, which

may be a very serious matter, since it is often a question of substances that are very harmful to other persons than e.g. the patient. The system with coupler means as shown in Figures 2 - 12 may be helpful in this case too.

When syringes 48, 50 are connected as shown in Figures 9, 11 and 12, the contents of the syringes may be moved from one syringe to the other and back (Figure 11) by the aid of plungers 26, 27, and in addition to a desired transfer to achieve a more accurate dosage (Figure 12), the medicaments may also be mixed and air 25 may, obviously, be removed from one syringe by being transferred to the other syringe (Figure 9).

A bushing member with a solid partition 42 may advantageously be used for a closure member for one or two syringes. It will be especially advantageous to use the bushing member for a closure means when said bushing member has a luer locking thread at one or both ends, see Figures 5 and 6, whereas the syringe has a bushing-shaped portion about its luer cone, corresponding to the locking bushing portion known from a luer plug. Such a possible embodiment of the syringe is shown in Figure 10 showing a modified syringe 48 with a luer tip 49 surrounded by an internally threaded bushing portion 54, which corresponds to the bushing portion known from luer plugs, see the above description of a luer plug. Bushing member 21 can then be screwed in place inside bushing-shaped portion 54, with luer thread 44 being screwed into bushing 54. In this manner the bushing member may be tightened well against cone 49 and is kept in place in its locking/closing position. The bushing member with a tight partition 42 may also, advantageously, be used for all couplings which are surrounded by an internally threaded bushing-shaped portion 54.

Not disclosed in the drawings is the possibility of using colour codes for the various components.

## Claims

1.  
An arrangement in connection with a rack for orderly storage and/or for keeping syringes with luer tips ready for use, said rack comprising receptacle means for the syringes, characterized in that the syringe receptacle means comprise spigots (11, 12, 24) which are integrated in the rack, and bushing members (21) which may be placed on respective spigots, said bushing members being shaped for receiving the luer tip of the syringes.

2.  
An arrangement as stated in claim 1, characterized in that spigots (11, 12, 24) are dimensioned to correspond to luer tips (luer cones).

3.

An arrangement as stated in claim 1, **characterized in** that each bushing member (21) has a conical receptacle means (40, 41) at each end, intended to receive a luer tip.

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4.

An arrangement as stated in claim 1, **characterized in** that spigots (11, 24) are provided in one row or a plurality of rows on a block-shaped rack (1).

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5.

An arrangement as stated in claim 1, **characterized in** that spigots (11) are provided on two opposite lateral block faces (2, 4).

6.

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An arrangement as stated in claim 1, **characterized in** that on one lateral block face (4) there are only spigots (24), whereas there are spigots (11, 12) and associated receptacle means (8, 9, 10) for needles, ampullae and other objects on the other lateral block face (2).

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7.

An arrangement as stated in claim 3, **characterized in** that bushing member (21) has an internal transversal wall or partition (42) so that the receptacle means (40, 41) are physically separated.

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8.

An arrangement as stated in claim 7, **characterized in** that partition (42) has a through orifice (43).

9.

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An arrangement as stated in claim 1, **characterized in** that bushing member (21) is provided with a luer-thread (44, 45) at each end.

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Fig. 1.

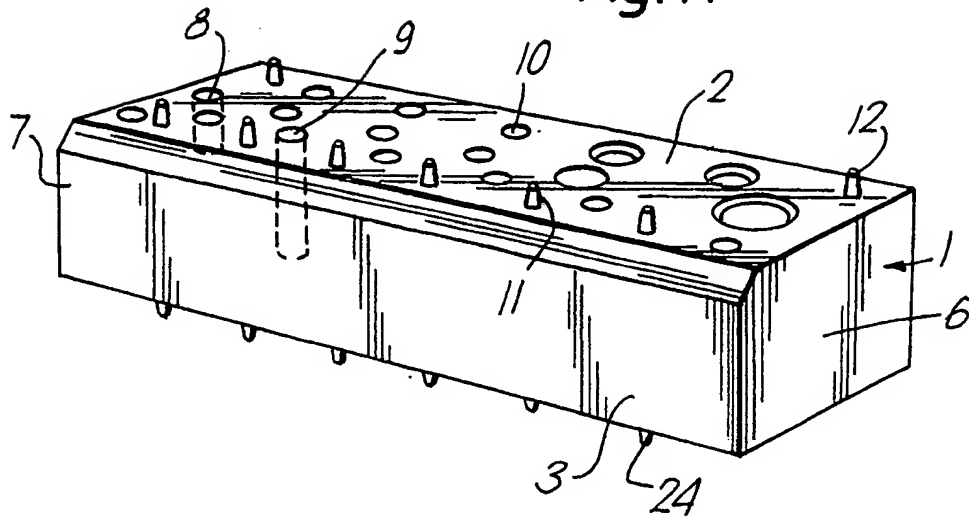


Fig. 2.

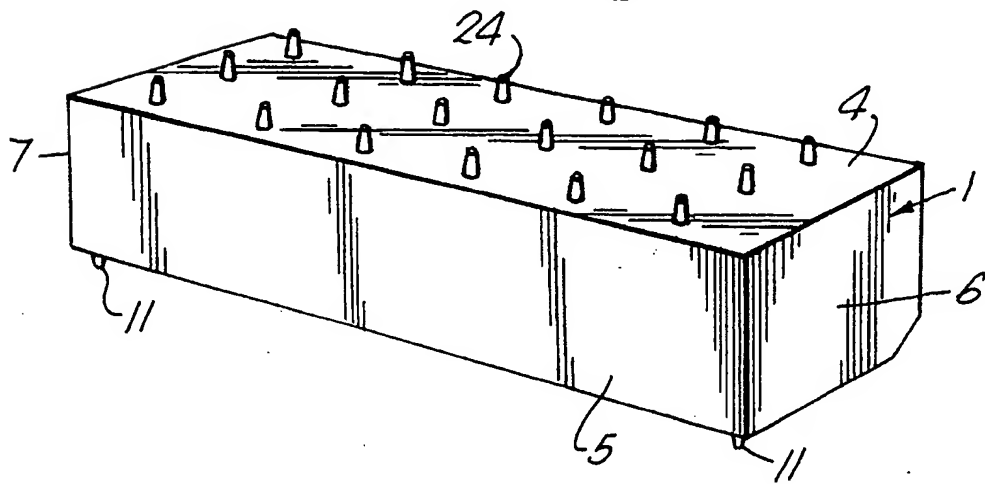


Fig.3.

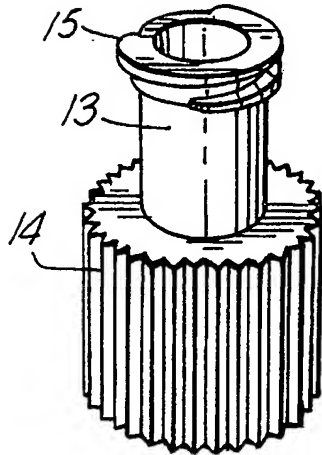


Fig.4.

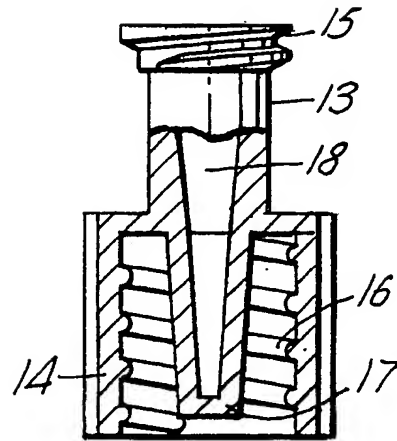


Fig.6.

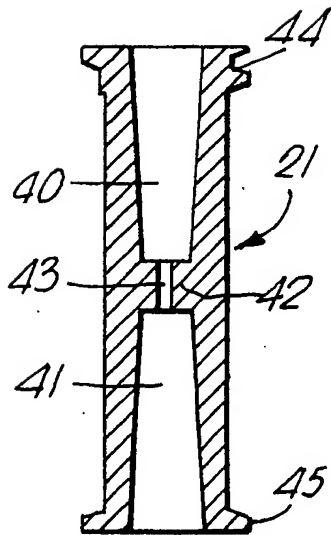


Fig.5.

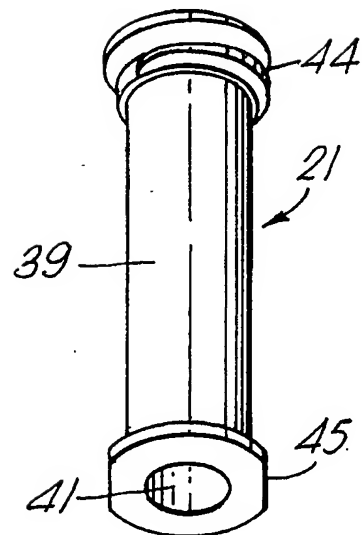




Fig.7.

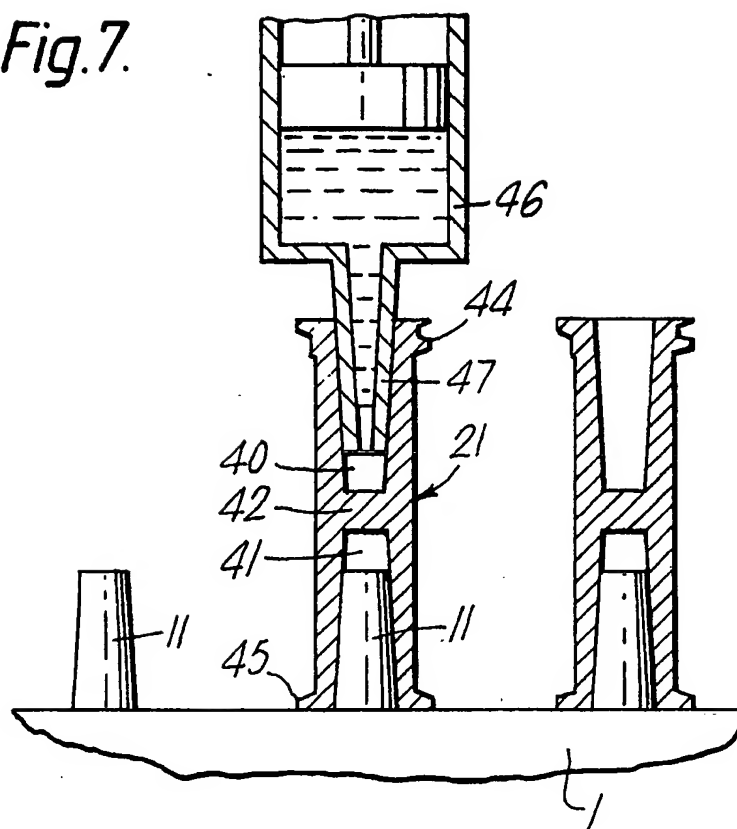


Fig.8.

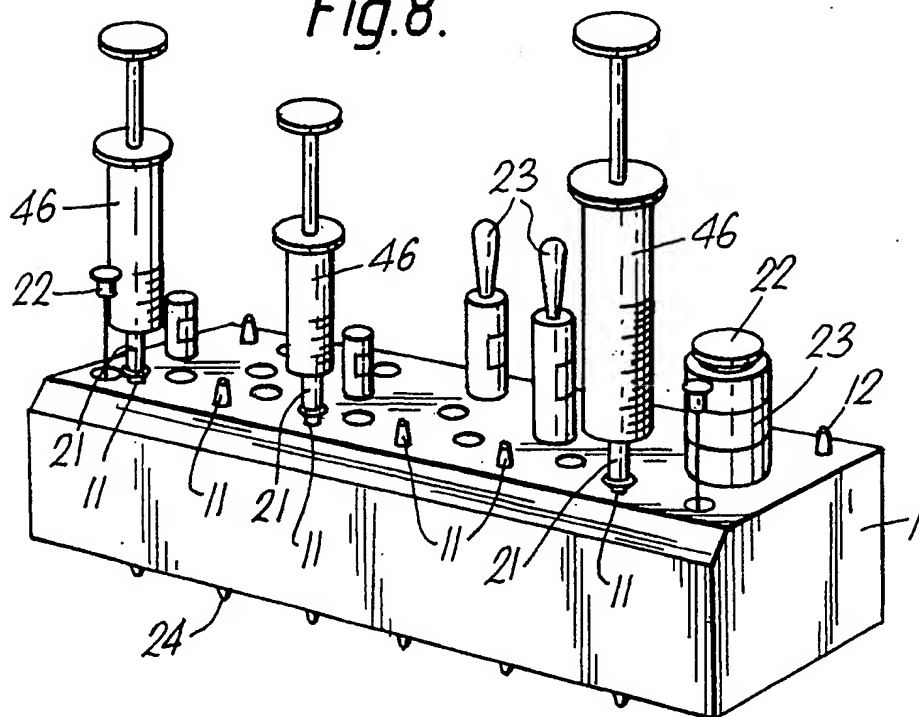


Fig. 9.

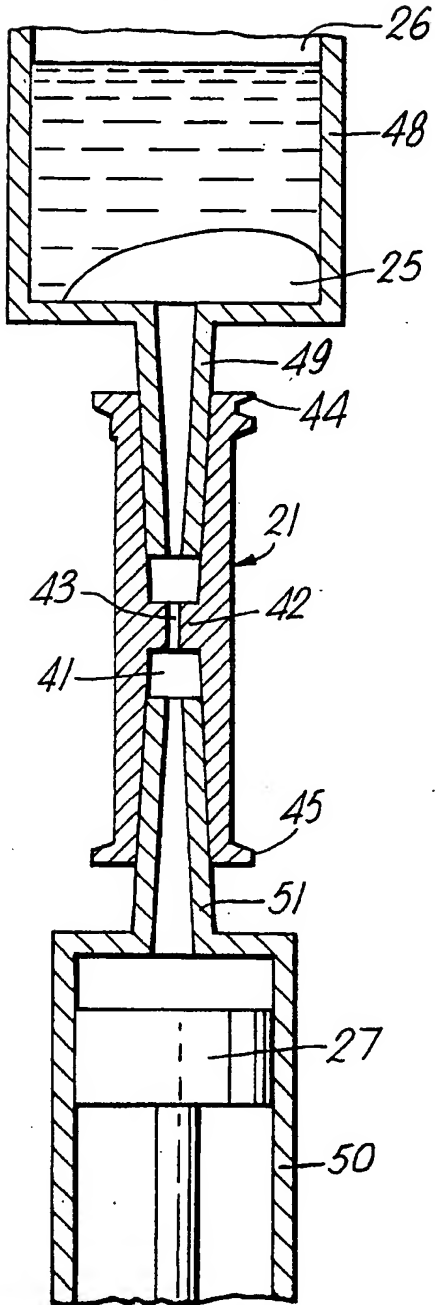


Fig. 10.

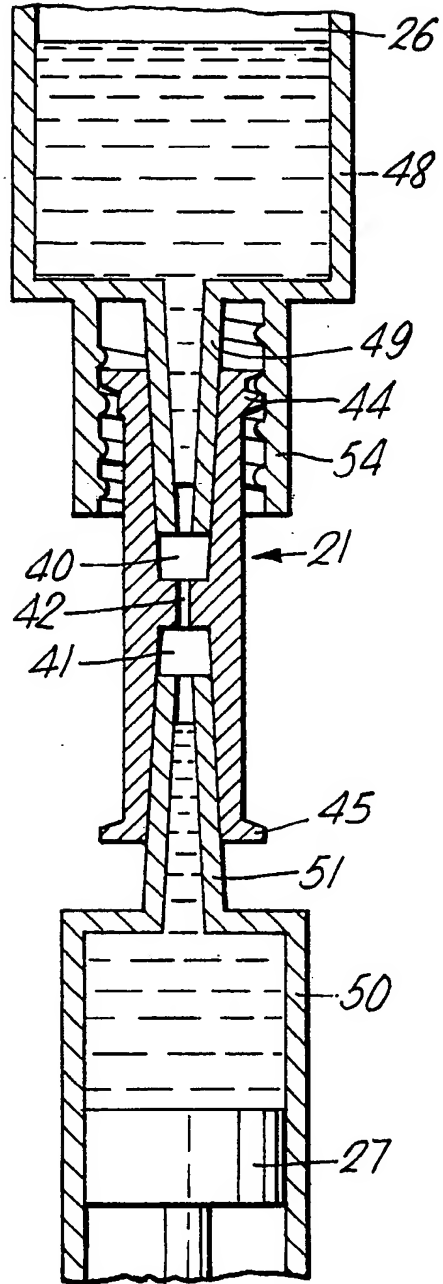


Fig.11.

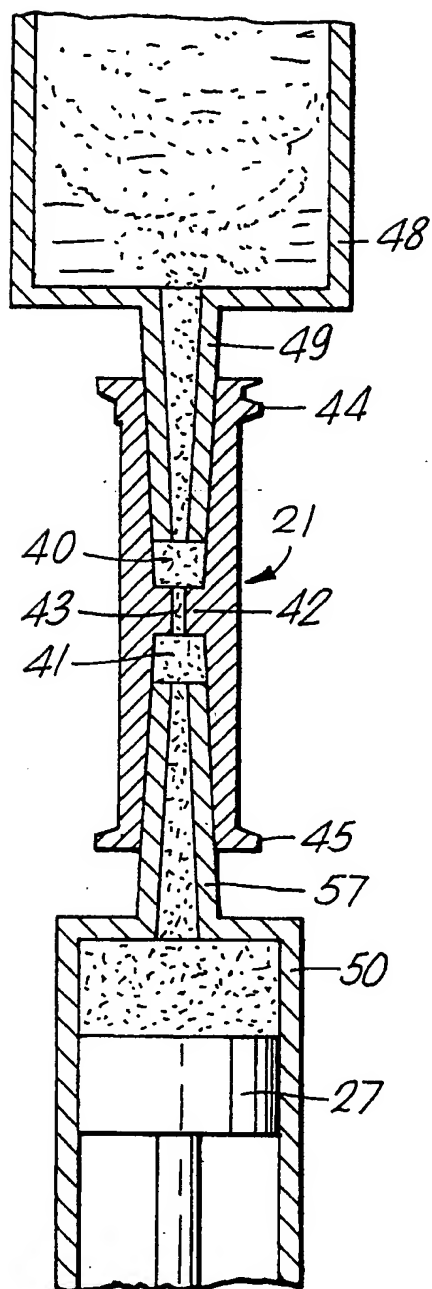


Fig.12.

